IS 11186 (1985): Synthetic Grinding Fluid [PCD 3: Petroleum, Lubricants and their Related Products]

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IS : 11186 - 1985
(Reaffirmed 2002)

Indian Standard

SPECIFICATION FOR SYNTHETIC GRINDING FLUID

UDC 621·892·28

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

September 1985

Indian Standard

SPECIFICATION FOR SYNTHETIC GRINDING FLUID

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Indian Standard

SPECIFICATION FOR SYNTHETIC GRINDING FLUID

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 4 February 1985, after the draft finalized by the Lubricants and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 This specification covers synthetic coolant for all grinding operations for iron, steel, chromium steel, etc. This is a non-staining type fluid and normally used after dilution with water.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for synthetic grinding fluids.

2. REQUIREMENTS

2.1 General Requirements

2.1.1 The material shall be prepared from synthetic products, water and chemicals. It should be dyed to impart colour to the product in order to differentiate it from water.

2.1.2 The material shall be clear transparent, homogeneous liquid, free from dirt and suspended matter.

*Rules for rounding off numerical values (*revised*).

2.2 Specific Requirements — The material shall comply with the requirements prescribed in Table 1, when tested according to the methods prescribed in the relevant appendices (*see* col 4) and in the 'P' series of IS : 1448* (*see* col 5) of the Table.

TABLE 1 REQUIREMENTS FOR SYNTHETIC GRINDING FLUID

Sl No.	Characteristic	Requirements	Method of Test, Ref to	
			Appendix	P : Method of IS : 1448*
(1)	(2)	(3)	(4)	(5)
i)	Colour	To be reported	Visual	—
ii)	Specific gravity at 15·6°C	To be reported	—	P : 32
iii)	Water content, percent by mass, *Min*	40	—	P : 40
iv)	*p*H of 2 percent solution with distilled water, *Min*	9·0	Any suitable method	—
v)	Cast iron corrosion test, 50:1 ratio emulsion / solution with distilled water, *Max*	0/0-0	A	—
vi)	Frothing test, 50:1 ratio with distilled water	No frothing after 15 min	—	P : 99
vii)	Dilution test	Shall pass the test	B	—

*Methods of test for petroleum and its products.

3. PACKING AND MARKING

3.1 Packing — The material shall be packed in securely closed metal drums or any other suitable containers of appropriate size and strength as agreed to between the purchaser and the supplier.

3.2 Marking — Each container shall be marked with the following information:

a) Name of the material;

b) Manufacturer's name, initials or trade-mark, if any;

c) Quantity of the content; and

d) Batch number and year of manufacture.

*Methods of test for petroleum and its products.

3.2.1 The container may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

4. KEEPING PROPERTIES

4.1 The material when stored in original sealed containers under ambient temperature conditions in shade shall retain the properties described in Table 1 for a period of not less than 6 months after the date of delivery.

5. SAMPLING

5.1 Representative sample of the material shall be drawn as prescribed in IS : 1447-1966*.

5.2 Number of Tests and Criteria for Conformity

5.2.1 All the characteristics given in **2** of the specification shall be tested on the composite sample.

5.2.2 The lot shall be declared as conforming to the requirements of the specification if all the test results on the composite sample meet the relevant specification requirements.

APPENDIX A

[*Table* 1, *Sl No.* (v)]

CAST IRON CORROSION TEST

A-1. SCOPE

A-1.1 Cutting oils which are used in the form of aqueous dispersions or solutions should not readily permit corrosion of equipment with which they come into contact. This method is accordingly designed to assess the

*Methods of sampling of petroleum and its products.

behaviour of such fluids in contact with a typical metal, such as cast iron; and is applicable to samples submitted either in the form of an aqueous fluid as used in practice or as a concentrate requiring dilution with water.

A-2. OUTLINE OF THE METHOD

A-2.1 Steel millings are placed on the cleaned surface of a cast-iron plate and emulsion of the cutting oil under test is poured on to them. After 24 hours the millings are removed and the surface of the plate is examined for corrosion.

A-3. APPARATUS

A-3.1 Test Plate — Conforming to Grade 25 of IS:210-1970*; 10 cm × 10 cm × 6 mm (orginally) of grey cast iron, the surface being ground to a smooth finish free from chatter marks and furnishings, CLA 0·25 to 3·38 μm.

A-3.2 Steel Millings — Approximately 6 mm long and 1·5 to 3 mm width prepared by dry-milling the steel conforming to IS:226-1975†.

A-3.3 Test Chamber — No dimensional limits are prescribed for the chamber. The temperature shall be maintained at 27 $\pm$ 2°C and the humidity at 52 $\pm$ 5 percent. The required level of humidity can be obtained by placing at the bottom of the cabinet at least one open dish, not less than 15 mm diameter, containing a saturated solution of sodium bisulphate in contact with an excess of solid bisulphate which give a humidity of 52 percent at 20°C. Lumps of solid bisulphate should stand out of the liquid. If a large chamber is used with several plates under test, several dishes may be desirable. Alternatively, seperate chambers, each with a dish of bisulphate, can be used one for each test plate.

A-3.4 Pipette — Calibrated to deliver 2 ml of the fluid.

A-4. PREPARATION OF SAMPLE

A-4.1 For carrying out this test the 20:1 ratio emulsion shall be prepared with 400 ppm hard water in accordance with the method given for emulsion and frothing tests.

A-5. PREPARATION OF APPARATUS

A-5.1 If the surface of any plate is correded or pitted, regrind the plate to a smooth surface. Do not allow the plate to become burnished.

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*Specification for grey iron castings (*second revision*).

†Specification for structural steel (standard quality) (*fourth revision*).

A-5.2 If the thickness of the plate is reduced to 3 mm, discard it.

A-5.3 Immediately prior to test, prepare the ground surface of the test plate as follows and do not touch the surface subsequently. Carry out this procedure irrespective of whether or not the plate has been used before, and whether or not it is new or reground:

a) Wipe with cotton wool soaked in toluene;

b) Wash with acetone from a wash-bottle;

c) Wipe dry with cotton wool;

d) Rub the plate on a new piece of No. 0 emery cloth placed on a flat surface (for example plate glass), rubbing heavily by hand for 30 double-strokes without lifting in each of two direction at right angles. A hand magnet may be found convenient to hold the plate for this operation. If stain marks are still apparent, treat the plate as pitted and regrind it;

e) Wipe with clean filter paper soaked in acetone; and

f) Rub with successive pieces of dry clean filter paper until no marks are apparent on the paper.

A-6. PROCEDURE

A-6.1 Make the test in a room free from corrosive fumes.

A-6.2 Take the millings and sieve with a standard 710-micron IS sieve [*see* IS : 460 (Part 1)-1962*]. Discard the dust and retain the millings. Discard all the millings if any rust is present.

A-6.3 Wash the millings in acetone and allow to dry in air. Thereafter, the millings should remain untouched by hand.

A-6.4 With the aid of a spatula, place 4 portions each of approximately 2 g of steel millings in a single layer each centrally in a quarter of the prepared surface of the plate. Each portion shall be so disposed that the edges are not in contact either with adjacent portions or the edges of the plate.

A-6.5 Pipette the fluid to be tested on the each portion of millings, so that the millings are thoroughly wetted. The fluids on adjacent portions shall not run together. About 2 ml of the fluid will be required per portion of millings. If testing several fluids at once, put the 4 portions on different plates as far as possible, so that each plate has several fluids on it. This minimizes error due to possible variations in plates.

A-6.6 Transfer the plate to the test chamber, the temperature and humidity of which is maintained as specified in **A-3.3**.

*Specification for test sieves: Part 1 Wire cloth sieves (*second revision*).

A-6.7 After 24 hours, remove the plate from the cabinet, remove the millings from the plate and discard them. Wash the surface of the plate with acetone then with toluene and finally rub gently with a filter paper soaked in toluene.

A-6.8 Inspect the surface areas of the plate for corrosion, and record pittings and staining results separately for each test area, for example, the areas previously covered by 2 g of steel millings as follows:

A-6.8.1 *Pitting* — Record the number of pits present.

A-6.8.2 *Staining* — Record the extent and intensity of staining using the following numbers:

Proportions of Test Area Stained	*Intensity of Staining*
0 Nil	0 Nil
1 Less than 10 percent	1 Hardly perceptible
2 Between 10 and 25 percent	2 Slight staining
3 Between 25 and 50 percent	3 Heavy staining
4 Between 50 and 75 percent	4 Surface damage (not including pits)
5 Over 75 percent	

If staining is not uniform record the maximum intensity observed.

A-7. REPORTING

A-7.1 Report the results by three numbers, the first being the number of pits, followed by an oblique stroke; the second, the area of staining followed by a hyphen; and the third, the maximum intensity of staining (for example: 0/1-1, 6/0-0, 0/3-2, etc).

A-7.1.1 Also report relevant test details, as follows:

a) Nature of added water used; and

b) Dilution if known and method of preparation, if relevant.

A-8. PRECISION

A-8.1 The precision cannot be expressed in a useful form to cover all cases. Extensive investigations have shown that it is very poor when the corrosion probability is of the order of 50 percent, but that it is better when either very little or considerable corrosion occurs. The use of statistically designed programmes are recommended whenever comparative tests are to be made.

APPENDIX B

[*Table* 1, *Sl No.* (vii)]

DILUTION TEST

B-1. PROCEDURE

B-1.1 Place 90 ml of distilled water in 100 ml graduated stoppered measuring cylinder and add 10 ml of the material at ambient temperature. Mix the mixture for 5 min by shaking. It shall remain clear and flouresant after 24 h. A trace of cream and dye separation is permitted.

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